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FOREIGN DIRECT INVESTMENT AND INDUSTRIAL PRODUCTION: A COMPARATIVE STUDY OF PAKISTAN, BANGLADESH, AND INDIA

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Abstract

It is commonly believed that rising economies may acquire finance, technology, and management expertise for industrialization through foreign direct investment (FDI). Although Bangladesh, India, and Pakistan have all adopted FDI-based growth plans, their industrial success has differed. Bangladesh has had rapid industrial growth with moderate inflows, India receives relatively substantial inflows compared to GDP, while Pakistan's industrial productivity has remained stable despite significant investment initiatives like the China–Pakistan Economic Corridor (CPEC). Using annual World Development Indicators data from 1980 to 2024, this study offers a comparative time-series analysis of the relationship between FDI and industrial production. With industrial production modelled as a function of FDI inflows, trade openness, human capital, and either domestic investment (Pakistan) or the exchange rate (Bangladesh and India), this study used the autoregressive distributed lag (ARDL) bounds testing approach to estimate long-run relationships and short-run error correction dynamics. Bounds tests confirm a long-run co-integrating relationship in all three countries. FDI has a positive and statistically significant long-run effect on industrial production in each country (coefficients of 0.353 for Pakistan, 0.422 for Bangladesh, and 0.749 for India), and a positive significant short-run effect in all three. The remaining determinants differ by country: domestic investment is negative and significant in Pakistan, trade openness is negative and significant in Bangladesh, and human capital is negatively signed in India. CUSUM and CUSUM-of-squares tests indicate stable parameters. The results suggest that FDI promotes industrial production in South Asia when it is accompanied by efficient domestic investment, human capital development, a competitive trade environment, and macroeconomic stability. Country-specific policy implications are discussed.

Keywords: FDI, Industrial Production, ARDL, Pakistan, Bangladesh, India

1. Introduction

Foreign direct investment (FDI) is widely recognized as an important driver of industrial transformation, technological advancement, and productivity growth, particularly in developing economies. In countries where domestic savings and investment resources are insufficient to finance industrial expansion, FDI serves not only as an additional source of capital but also as a channel through which advanced production technologies, managerial expertise, technical skills, and international market access are transferred. These complementary resources can strengthen domestic productive capacity, improve industrial efficiency, and facilitate structural transformation. Consequently, FDI has become an important instrument for promoting industrialization and sustaining long-term economic growth, particularly in capital-scarce and labour-abundant economies.

The theoretical relationship between FDI and industrial production is primarily supported by endogenous growth theory and international trade theory. Endogenous growth theory emphasizes that sustained economic growth originates from internal productivity-enhancing factors, including human capital

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accumulation, technological innovation, knowledge spillovers, and capital deepening (Romer, 1986; Lucas, 1988). Within this framework, FDI contributes to industrial development by facilitating technology transfer, strengthening workforce capabilities, and generating productivity spillovers across domestic industries. In particular, Borensztein et al. (1998) highlight the importance of FDI as a mechanism for transferring both tangible and intangible resources, particularly advanced technologies and managerial expertise. Similarly, the Heckscher–Ohlin–Vanek framework suggests that countries specialize in producing goods that intensively utilize their relatively abundant factors of production (Vanek, 1968). FDI can reinforce this specialization by introducing foreign capital, technological capabilities, and production innovations. Collectively, these theoretical perspectives suggest that FDI can enhance industrial productivity and production capacity, although the magnitude of its contribution depends on complementary domestic conditions, particularly human capital, institutional quality, and infrastructure.

Conceptually, FDI refers to an investment through which an investor from one economy establishes a lasting interest and exercises a significant degree of influence or control over an enterprise operating in another economy. Internationally, ownership of at least 10 percent of voting power is conventionally used to identify a direct investment relationship. Unlike portfolio investment, which generally involves passive ownership of financial assets, FDI represents a longer-term investment commitment involving equity capital, reinvested earnings, and intra-company debt transactions, often accompanied by managerial participation (Gupta, 2024). Multinational enterprises undertake foreign investment for several strategic reasons, including market expansion, resource acquisition, and access to production efficiencies. In particular, resource-seeking FDI is directed towards economies possessing abundant natural resources, including minerals, oil, and gas. Evidence from Cambodia suggests that foreign investment directed towards sectors in which the host economy possesses comparative advantages can strengthen economic performance (Kenh & Wei, 2025). Through technological advancement, knowledge diffusion, and the integration of productive resources, FDI can improve industrial productivity beyond the capabilities of conventional labour-intensive production systems (Bellah & Tao, 2024). It also strengthens international economic integration by facilitating technology diffusion and cross-border trade (Rani et al., 2024).

The comparative experience of South Asian economies further illustrates the importance of FDI in shaping industrial performance. Although Pakistan, Bangladesh, and India share several historical, geographical, and demographic characteristics, their industrial development trajectories differ considerably, reflecting variations in investment environments, institutional capacity, and industrial policies. World Bank indicators suggest that average FDI inflows during the study period remained relatively modest in Pakistan, accounting for approximately 1–2 percent of GDP. This relatively limited investment performance can partly be associated with political instability, energy constraints, and institutional weaknesses. Bangladesh received approximately 1.5 percent of GDP in FDI inflows but achieved substantial industrial expansion, largely supported by export-oriented manufacturing, particularly the ready-made garments sector. In contrast, India attracted comparatively higher FDI inflows, averaging approximately 2–3 percent of GDP, supported by its large domestic market, economic liberalization, and improvements in the business environment. Differences in industrial value added further highlight these contrasting development patterns. Bangladesh has experienced a sustained increase in industrial value added, exceeding 30 percent of GDP in recent years, reflecting its strong capacity to translate investment into industrial expansion. India's industrial value added has fluctuated around 25–27 percent, partly reflecting the growing contribution of the services sector to overall economic activity. Pakistan, however, has maintained an industrial value-added share of approximately 20 percent, indicating relatively limited industrial deepening despite major investment initiatives, including the China–Pakistan Economic Corridor (CPEC). These differences raise important questions regarding the extent to which FDI contributes to industrial production under varying country-specific economic and institutional conditions.

Empirical evidence from Pakistan generally indicates a favourable relationship between FDI and industrial development, although the magnitude and direction of its effects vary across studies and estimation approaches. Asif et al. (2025), employing annual data for 1980–2023 within an autoregressive distributed lag

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(ARDL) framework, examined FDI alongside domestic credit to the private sector and electricity supply. Their findings reveal positive long-run effects on industrial growth and emphasize the importance of complementing foreign investment with adequate private-sector financing and reliable electricity provision. Similarly, Mehmood et al. (2025), investigating the combined influence of FDI and ease of doing business on industrial value added over the same period, identified significant positive long-run effects but negative short-run effects. Using data covering 1972–2023, Iqbal et al. (2025) applied the ARDL bounds-testing approach and established that FDI and exports significantly influence large-scale manufacturing growth in both the short and long run. At the sectoral level, Suleman and Amin (2015), employing a Cobb–Douglas production function and panel data for manufacturing, construction, and mining and quarrying during 1997–2011, demonstrated that sector-specific FDI promotes industrial growth. In a related investigation, Hussain (2017) found that FDI enhances labour productivity among domestic firms, alongside the contributions of capital intensity, economies of scale, firm size, and firm age. Amjid and Shah (2024) also reported a positive long-run association between FDI and industrial output, whereas inflation and exchange rate fluctuations exerted adverse effects. Nevertheless, the available evidence is not entirely conclusive. Ullah et al. (2012), applying the two-stage least squares (2SLS) technique, found that FDI adversely affects agricultural growth while its positive effect on the industrial sector remains statistically insignificant. More recently, Waqar et al. (2023) documented improvements in technological capabilities, product quality, and employment resulting from FDI in Pakistan's automobile sector, although its broader contribution to overall economic development remains less conclusive.

The empirical literature on Bangladesh also presents mixed evidence regarding the contribution of foreign investment to productivity and industrial development. Ahamad et al. (n.d.) found that official development assistance positively influences total factor productivity in both the short and long run, whereas FDI appears to exert a negative effect. In contrast, Begum et al. (2023), examining the period 1987–2020, established that FDI inflows have positive and statistically significant effects on GDP, exports, and industrial value added. From a forward-looking perspective, Islam et al. (2024) employed autoregressive integrated moving average (ARIMA) and random forest techniques to forecast net FDI inflows using data for 1986–2022. Their projections indicated a continued declining trend, with average inflows estimated at approximately US$1,664 million, raising concerns regarding Bangladesh's capacity to achieve its Vision 2041 objectives of eliminating extreme poverty and attaining high-income status. Furthermore, Bangladesh Bank (2023) reports that foreign investment has expanded steadily in textiles, telecommunications, and energy, supported by investment-related reforms and the establishment of Export Processing Zones. Taken together, these findings suggest that although FDI has contributed to Bangladesh's export-oriented industrial expansion, its productivity implications may differ across sectors and investment destinations.

Evidence from India similarly underscores the contribution of foreign investment to manufacturing expansion, technological progress, and industrial capacity. Mehta et al. (2023), employing the ARDL bounds-testing approach and Granger causality analysis, demonstrated that FDI stimulates manufacturing output, with human capital strengthening technology spillovers and technological differences between host and home countries influencing the magnitude of these effects. Kumar and Agarwal (2024) further emphasized the importance of FDI in sustaining industrial growth, particularly within the automobile industry. Hayat et al. (2026) documented the contribution of foreign investment to capacity expansion, technological innovation, and employment generation in Indian manufacturing. Similarly, Singh et al. (2023) identified manufacturing, infrastructure, and services as the principal sectors benefiting from foreign investment. Collectively, these studies indicate that India's ability to attract foreign capital and integrate it into productive sectors has played an important role in strengthening its industrial capabilities.

Beyond South Asia, international empirical evidence provides further support for the relationship between FDI and industrial performance, while highlighting considerable variations across countries and sectors. In Indonesia, Alfarizsy and Ekananda (2024) identified a positive and statistically significant effect of FDI on manufacturing value added. Similarly, Sugiharti et al. (2022) demonstrated that foreign investment generates productivity and technical-efficiency spillovers among Indonesian manufacturing firms, with

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particularly pronounced benefits in high-technology industries. However, Sari et al. (2021) reported heterogeneous spillover effects, identifying negative backward linkages and positive forward linkages in high-technology manufacturing. In Tanzania, Kitole and Utouh (2023), using VAR and VECM techniques for the period 1960–2020, established that FDI Granger-causes industrialization and contributes positively to long-run industrial development, while exchange rate movements influence industrial performance in the short run. Likewise, Shamshedin and Jie (2019) identified a long-run equilibrium relationship and a positive, statistically significant long-run effect of FDI on industrialization in Ethiopia, although its short-run effect was insignificant. For Turkey, Bilgili et al. (2016) established bilateral long-run nonlinear cointegration between FDI and industrial output, whereas Karimov and Huseynova (2024) identified bidirectional causality between FDI and economic growth. At the firm and sectoral levels, Essel (2019) documented a strong positive effect of FDI on the productivity of Ghanaian manufacturing firms, while Koroci et al. (2016) identified positive technological spillovers in Albanian manufacturing without evidence of crowding out domestic production. Evidence from China is similarly diverse. Zhang et al. (2024) established long-run cointegration and bidirectional causality between FDI and sectoral growth, whereas Zhong and Sun (2020) identified a negative effect of manufacturing-related FDI on green total factor productivity. In Egypt, Ingham et al. (2020) found that aggregate FDI adversely affects economic growth, potentially through crowding-out mechanisms, although sector-specific investment in manufacturing and petroleum generates positive effects. These findings demonstrate that the industrial implications of foreign investment depend substantially on its sectoral composition, technological orientation, and interaction with domestic productive capabilities.

Cross-country panel evidence further emphasizes the importance of institutional and structural conditions in determining the effectiveness of FDI. Sinha and Sengupta (2019) identified bidirectional causality between FDI and industrial performance in developing economies, while reporting comparatively stronger effects in developed countries. Similarly, Ullah et al. (2022), employing the 2SLS technique for 85 developing economies over 1996–2019, demonstrated that the growth effects of sectoral FDI vary across income groups and that business regulation negatively interacts with sector-specific foreign investment. Investigating 13 Middle Eastern and North African economies, Bergougui and Murshed (2023) found that FDI promotes economic growth overall, although investment directed towards primary sectors adversely affects growth, while services-sector investment generates beneficial spillovers for other sectors. Haini and Tan (2022) further established that education, trade openness, and institutional quality moderate the growth effects of sectoral FDI in OECD economies. At the firm level, Vrinceanu et al. (2023) demonstrated that the performance implications of foreign investment differ between high- and low-technology industries. Overall, these findings reinforce the argument that the contribution of FDI to industrial development is conditional rather than uniform, depending on the characteristics of host economies and the sectors receiving foreign investment.

The preceding theoretical and empirical discussions indicate that the relationship between FDI and industrial production is neither automatic nor homogeneous across countries. Although foreign investment can stimulate industrial expansion through capital accumulation, technological diffusion, productivity spillovers, and international market integration, its effectiveness largely depends on the availability of complementary domestic conditions. In particular, human capital development, trade openness, macroeconomic stability, exchange rate management, infrastructure, and institutional quality play important roles in determining the extent to which host economies can convert foreign capital into sustainable industrial production. In the absence of these complementary factors, FDI may be concentrated in relatively low-productivity or resource-extractive activities, limiting its contribution to broader industrial transformation.

Despite the extensive empirical literature on FDI and economic growth, several important research gaps remain. First, much of the existing literature concentrates on aggregate economic growth, GDP, or total factor productivity, while comparatively limited attention has been devoted to industrial production as a direct indicator of productive capacity and structural transformation. Second, the empirical evidence is predominantly based on individual-country investigations, providing limited opportunities to identify similarities and differences in the industrial responses of economies sharing common regional characteristics.

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Third, the existing literature reports mixed findings regarding the short-run and long-run effects of FDI, suggesting that its contribution to industrial development may differ considerably across economic environments. Finally, comparable time-series evidence examining the FDI–industrial production relationship across major South Asian economies remains relatively scarce.

To address these limitations, the present study investigates the effects of FDI on industrial production in Pakistan, Bangladesh, and India over the period 1980–2024 within a comparable ARDL econometric framework. By distinguishing between short-run dynamics and long-run equilibrium relationships, the study provides a more comprehensive assessment of how foreign investment influences industrial performance across these three economies. The ARDL approach is particularly appropriate because it accommodates regressors integrated at different orders, provided that none of the variables is integrated of order two, I(2).

The study makes three principal contributions to the existing literature. First, it shifts the analytical focus from aggregate economic growth towards industrial production, thereby providing more direct insights into the contribution of FDI to industrial capacity and structural transformation. Second, it adopts a comparative country-level framework for Pakistan, Bangladesh, and India, allowing the identification of common patterns and country-specific differences in the relationship between foreign investment and industrial performance. Third, by employing a relatively long and updated sample covering 1980–2024, the study provides an opportunity to examine the stability and evolution of the FDI–industrial production relationship across different economic conditions and policy environments. These contributions are expected to enrich the existing empirical literature and provide useful policy insights for strengthening the industrial benefits of foreign investment in South Asia.

Table 1

Summary of Selected Studies from the Literature

Study	Country and period	Estimation method	Main findings
Asif et al. (2025)	Pakistan (1980–2023)	ARDL	FDI has a positive long-run effect on industrial growth.
Mehmood et al. (2025)	Pakistan (1980–2023)	ARDL	FDI positively affects industry value added in the long run but has a negative short-run effect.
Iqbal et al. (2025)	Pakistan (1972–2023)	ARDL	FDI and exports contribute positively to large-scale manufacturing growth.
Suleman and Amin (2015)	Pakistan (1997–2011)	Panel cointegration	Sector-specific FDI promotes industrial growth.
Ahamad et al. (n.d.)	Bangladesh (1985–2019)	ARDL bounds testing	FDI negatively affects total factor productivity (TFP), whereas foreign aid has a positive effect.
Begum et al. (2023)	Bangladesh (1987–2020)	Correlation and regression analysis	FDI contributes positively to GDP, exports, and industrial value added.
Mehta et al. (2023)	India	ARDL and Granger causality	FDI enhances manufacturing output, particularly through human capital and technological development.
Kitole and Utouh (2023)	Tanzania (1960–2020)	VAR and VECM	FDI has a positive long-run effect on industrialization.
Ullah et al. (2022)	85 developing countries (1996–2019)	Two-stage least squares (2SLS)	The effects of FDI vary across industrial sectors and income groups.
Shamshedin and Jie (2019)	Ethiopia (1992–2017)	VECM	FDI has a positive long-run effect, while its short-run effect is statistically insignificant.

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Note. Compiled by the authors from the cited studies.

Although FDI and industrial growth have been studied separately for Pakistan, India, and Bangladesh, little comparative evidence exists that examines the three through a consistent set of time-series methods. Existing studies emphasize aggregate growth, exports, or employment and say little about the direct effect of FDI on industrial production, which is a more specific indicator of structural change and productive capacity. Most are single-country designs, which limits understanding of why similar economies respond differently to similar FDI inflows. Many cross-country and panel studies can hide country-specific adjustment and institutional differences, and complementary variables such as trade openness, exchange rate variation, human capital, and domestic investment efficiency have been handled inconsistently even though theory assigns them a role in conditioning the industrial effect of FDI. The divergent experiences are also poorly explained: stagnant industrial productivity in Pakistan despite CPEC, strong industrial performance in Bangladesh with moderate but export-oriented FDI, and sectorally uneven industrial spillovers in India despite the largest inflows.

2. Methodology

This study aimed to examine the effect of FDI on industrial production in Pakistan, Bangladesh, and India. Such investment in capital and infrastructure facilitates technology transfer in the form of knowledge and innovation, and thereby raises industrial production through higher output, efficiency, and employment. The model therefore includes variables that represent the channels through which FDI raises industrial productivity: trade openness, human capital, and capital formation or exchange rate conditions.

2.1 Baseline Model

The baseline model is specified in functional form is based on the studies by Ali et al. (2019a, 2019b), Parveen et al. (2021), Khan et al. (2020), Huang et al. (2022), and Luan et al. (2022).

$$IP = f|F, D, I, TRDHCINV|$$

and for estimation as the regression

$$IP_t = \beta_0 + \beta_1 FDI_t + \beta_2 TRD_t + \beta_3 HC_t + \beta_4 INV_t + \epsilon_t$$

where $\beta_0$is the intercept, $\beta_1, \ldots, \beta_4$are the long-run coefficients, and $\epsilon_t$captures the effect of omitted variables and outliers. This specification is estimated for Pakistan. For Bangladesh and India, the exchange rate (EXR) takes the place of domestic investment, so the explanatory variables are FDI, TRD, HC, and EXR. The three country models therefore share the same FDI, trade, and human capital variables but differ in the fourth control; this should be borne in mind when comparing coefficients.

2.2 Data and Variables

The study uses annual time-series data for 1980–2024, subject to availability, for Pakistan, Bangladesh, and India. The data are compiled from the World Development Indicators (WDI) of the World Bank, UNCTAD statistics, and International Monetary Fund data, supplemented by the Pakistan Economic Survey and publications of the State Bank of Pakistan, the Reserve Bank of India, and Bangladesh Bank.

Table 2

Variable Definitions and Sources

Variable	Definition	Source
IP	Industrial Production Index (2015 = 100)	WDI
FDI	Net FDI inflows as a share of GDP (FDI net inflow ÷ GDP × 100)	WDI
TRD	Trade Openness: (exports + imports) ÷ GDP × 100	WDI
HC	Human capital: gross secondary/tertiary enrollment rate	WDI
INV	Gross fixed capital formation as a share of GDP (Pakistan)	WDI
EXR	Exchange Rate (Pakistan, Bangladesh and India) vs USD	WDI

Industrial production covers manufacturing and mining and is a key indicator of economic performance because it reflects activity in goods-producing industries. It is normally expressed as an index that tracks changes in output volume relative to a base year, and it is used to approximate economic

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development, analyze business cycles, and judge trade and industrial policy. In this study the index is measured with 2015 as the base year, with manufacturing defined under ISIC divisions 15–37, where value added is net output after summing all outputs and subtracting intermediate inputs. FDI is measured as net inflows, that is, new investment inflows less disinvestment by foreign investors, scaled by GDP. Trade openness shows how integrated a country is with the global economy. Gross fixed capital formation comprises acquisitions of fixed assets less disposals, plus certain expenditures that add value to non-produced assets, and as a share of GDP it summarizes the link between investment, productive capacity, and growth.

2.3 Estimation Strategy

Because the data are time series, stationarity must be established before estimation, to avoid spurious regression. The Augmented Dickey–Fuller (ADF) test is used, as is standard in the literature. The ARDL bounds testing approach of Pesaran et al. (2001) is then applied, since it accommodates variables that are integrated of order zero or one and performs well in relatively small samples. The empirical procedure has four steps: (1) test the order of integration of each variable with the ADF test; (2) apply the bounds test to determine whether a long-run relationship exists; (3) estimate the long-run coefficients to quantify the effect of FDI on industrial production; and (4) estimate the short-run error correction model (ECM) to capture adjustment dynamics.

The unrestricted error-correction form of the ARDL model for the Pakistan specification can be written as

$$\Delta IP_t = \alpha_0 + \sum_{i=1}^{p} \alpha_{1i}\,\Delta IP_{t-i} + \sum_{i=0}^{q_1} \alpha_{2i}\,\Delta FDI_{t-i} + \sum_{i=0}^{q_2} \alpha_{3i}\,\Delta TAD_{t-i} + \sum_{i=0}^{q_3} \alpha_{4i}\,\Delta HC_{t-i} + \sum_{i=0}^{q_4} \alpha_{5i}\,\Delta INV_{t-i} + \theta_1 IP_{t-1} + \theta_2 FDI_{t-1} + \theta_3 TRD_{t-1} + \theta_4 HC_{t-1} + \theta_5 INV_{t-1} + \varepsilon_t$$

The bounds test is an F-test of the joint null $H_0: \theta_1 = \theta_2 = \theta_3 = \theta_4 = \theta_5 = 0$. If the F-statistic exceeds the upper critical bound, the null of no long-run relationship is rejected; if it lies between the bounds the test is inconclusive; and if it falls below the lower bound there is no cointegration. The short-run model replaces the lagged levels with an error-correction term whose coefficient measures the speed of adjustment toward long-run equilibrium. Estimation is carried out at the 5 percent significance level, with the same procedure applied to the Bangladesh and India specifications (with EXR in place of INV).

2.4 Diagnostic and Stability Tests

The reported diagnostics are the Breusch–Godfrey serial correlation LM test, the Breusch–Pagan–Godfrey heteroskedasticity test, and the Jarque–Bera normality test, which together assess whether residuals are serially uncorrelated, homoscedastic, and normally distributed. Parameter stability is assessed with the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ) tests, which indicate whether the estimated coefficients are affected by structural or policy changes during the sample period.

3. Results and Discussions

3.1 Unit Root Testing and Co-integration

The ADF results, presented in Table 3, show mixed orders of integration. Most variables are stationary in first differences, while domestic investment in Pakistan and human capital in Bangladesh are stationary in levels. This mixture justifies the ARDL bounds approach.

Table 3

Order of Integration (ADF Test)

Variable	Pakistan	Bangladesh	India
IP	I(1)	I(1)	I(1)
FDI	I(1)	I(1)	I(1)
TRADE	I(1)	I(1)	I(1)
HC	I(1)	I(1)	I(1)
INV	I(0)	not significant	not significant
EXR	not significant	I(1)	I(1)

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Table 4 reports the bounds tests. In all three countries the F-statistic exceeds the upper critical bound, so the null hypothesis of no long-run relationship is rejected. The variables in each model share a long-run equilibrium relationship.

Table 4

ARDL Bounds Test (K = 4)

Country	F-statistic	Lower bound	Upper bound	Decision
Pakistan	6.2856	3.29	4.37	Co-integration
Bangladesh	3.487	2.22	3.09	Co-integration
India	5.453	2.56	3.49	Co-integration

3.2 Pakistan

The Pakistan model explains industrial production by FDI, trade, human capital, and domestic investment. Long-run estimates are in Table 5.

Table 5

Long-Run Estimates (Pakistan)

Variable	Coefficient	Std. error	t-statistic	Prob.
FDI	0.35347	0.11659	3.0314	0.0045
TRD	0.0235	0.0325	0.7258	0.4726
INV	−0.2055	0.0977	−2.1034	0.0425
HC	0.0229	0.0244	0.9369	0.3550
C	18.3453	2.1746	8.4360	0.0000

FDI has a positive and statistically significant long-run effect on industrial production (coefficient 0.353, $p = 0.0045$): a one-unit increase in FDI is associated with an increase of about 0.35 units in industrial production. Trade openness (0.0235, $p = 0.4726$) is positive but insignificant, suggesting that trade alone does not significantly affect industrial output in the sample, even though openness may promote industrial growth through access to larger markets and advanced inputs. Domestic investment has a statistically significant negative long-run coefficient (−0.2055, $p = 0.0425$). This unexpected result may reflect low capital productivity, inefficient allocation of domestic investment, or structural problems that prevent investment from raising industrial output. Human capital (0.0229, $p = 0.3550$) is positive but insignificant, implying that its quantity or quality has been insufficient to affect industrial progress meaningfully over the long run. The highly significant constant (18.3453) suggests that unobserved factors outside the model also matter.

The null hypothesis is rejected for Pakistan. The result agrees with Suleman and Amin (2015), who found that sectoral FDI raises industrial growth, and differs from Ullah et al. (2012), who found a statistically insignificant industrial effect.

Table 6

Short-Run Estimates (Pakistan)

Variable	Parameter	Std. error	t-value	Prob.
DIP(−1)	0.47	0.136	3.44	0.001
DFDI	0.42	0.18	2.22	0.032
DHC	−0.38	0.012	−2.96	0.005
DINV	0.001	0.005	0.012	0.99
DTRD	0.002	0.002	0.12	0.90

In the short run, lagged industrial production has a negative and significant coefficient (−0.47) consistent with an adjustment mechanism in which previous gains are dampened, giving cyclical behavior. FDI has a positive and significant short-run effect (0.42, $p = 0.032$), indicating that foreign capital quickly stimulates productivity by providing capital, technology, and managerial skills. Human capital has a negative and significant short-run effect (−0.38, $p = 0.005$), which may reflect a temporary productivity cost as workers adapt to new skills. Domestic investment and trade have no short-run effect, which is plausible since investment and trade gains such as technology diffusion and export-led efficiency take time to materialize.

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The lagged change in industrial production is insignificant, implying weak short-run momentum in Pakistan's industrial sector.

3.3 Bangladesh

The Bangladesh model uses FDI, the exchange rate, human capital, and trade as regressors. Table 7 presents the long-run results.

Table 7

Long-Run Estimates (Bangladesh)

Variable	Coefficient	Std. error	t-statistic	Prob.
FDI	0.422	0.191	2.209	0.038
EXR	0.140	0.056	2.480	0.019
HC	0.020	0.072	0.286	0.776
TRD	−0.527	0.192	−2.741	0.014
C	18.5	3.373	5.488	0.000

FDI has a positive and significant long-run effect on industrial production (0.422, $p = 0.042$), the largest FDI coefficient among the three countries. The exchange rate also has a positive and significant effect (0.140, $p = 0.019$), whereas human capital is positive but insignificant (0.020, $p = 0.776$). Trade openness has a negative and significant effect (−0.527, $p = 0.014$), so increases in trade are associated with lower industrial production in this model. The null hypothesis is rejected for Bangladesh. The finding contrasts with Ahamad et al. (n.d.), who found no positive effect of FDI on total factor productivity, but it parallels Kitole and Utouh (2023), who report a strong positive long-run effect of FDI on industrialization in Tanzania.

Table 8

Short-Run Estimates (Bangladesh)

Variable	Parameter	Std. error	t-value	Prob.
DIP(−1)	0.28	0.09	−3.04	0.004
DFDI(−1)	2.13	0.72	2.94	0.000
DEXR	0.04	0.02	1.97	0.05
DHC(−1)	0.00	0.02	0.28	0.77
DTRD(−1)	−0.15	0.044	−3.39	0.00
ECT	0.15	0.153	0.99	0.32

The short-run results show that past industrial productivity adjusts negatively into current productivity, so the system corrects past fluctuations. FDI raises industrial productivity in the short run (2.13), implying that inflows of capital, technology, and expertise quickly translate into productive performance. Exchange rate movements are also significant ($p = 0.05$), so currency changes affect industrial activity in the short term. Human capital is insignificant in the short run, which suggests that its contribution emerges over the long run. Trade has a negative short-run effect (−0.15), meaning that fluctuations in trade volumes can temporarily depress industrial productivity. Overall, short-run dynamics in Bangladesh combine adjustment pressures with immediate responses to external economic conditions.

3.4 India

The India model uses FDI, human capital, trade, and the exchange rate. Industrial production averages 15.83 (range 12.93 to 17.87) and FDI averages 0.97 (range 0.003 to 3.621). Long-run results are in Table 9.

Table 9

Long-Run Estimates (India)

Variable	Coefficient	Std. error	t-statistic	Prob.
FDI	0.749	0.211	3.538	0.001
HC	−0.095	0.047	−1.992	0.051
TRD	0.027	0.014	1.924	0.065
EXR	0.001	0.036	0.043	0.058
C	18.3	30.5133	35.712	0.000

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FDI has a positive and highly significant long-run effect on industrial production (0.749, $p = 0.001$). Human capital has a negative coefficient (−0.095, $p = 0.051$), while trade openness (0.027, $p = 0.065$) and the exchange rate (0.001, $p = 0.058$) are positive; these three are significant only at about the 10 percent level or marginally so. The null hypothesis is rejected for India. The result agrees with Mehta et al. (2023), who found that FDI raises Indian manufacturing output, and with Kumar and Agarwal (2024), who stress the role of FDI in modernizing the automobile industry.

Table 10

Short-Run Estimates (India)

Variable	Parameter	Std. error	t-value	Prob.
DFDI(1)	0.45	0.17	2.65	0.013
DHC	0.17	0.057	3.04	0.005
D(HC(−1))	0.11	0.05	1.97	0.05
D(TRD)	0.00	0.021	0.17	0.85
D(EXR)	−0.23	0.047	−5.01	0.000
ECT	−0.8300	0.133	−6.2400	0.000

In the short run, FDI has a positive and significant effect (0.45, $p = 0.013$), indicating that foreign capital and technology have an immediate positive impact. Human capital also has a positive and significant short-run effect (0.17, $p = 0.005$), as does its lagged change (0.11), which shows that a skilled workforce matters for productivity and that recent advances in education or skill formation have direct effects. Short-run changes in trade volumes have no noticeable effect. Exchange rate changes have a strongly negative short-run effect (−0.23, $p = 0.000$), so depreciation or instability can quickly disturb performance. The error-correction term is negative and significant, which confirms a stable adjustment process in which short-run departures from the long-run equilibrium are corrected over time.

CUSUM and CUSUM-of-squares tests were applied to all three models. In each case the estimated statistic remains inside the 5 percent critical lines without crossing or touching them, so the coefficients are stable over the sample period and no structural break invalidates the estimates. Together with the diagnostic tests described in Section 2.4, which reveal no serious econometric problems, this supports the reliability of the long-run and short-run estimates.

The estimates provide consistent evidence that FDI contributes significantly to industrial production in Pakistan, Bangladesh, and India, but they also show that the surrounding conditions differ across countries. Table 11 summarizes the comparative results.

Table 11

Comparative Results for Selected Countries

Country	FDI long-run effect	Significance	Short-run FDI effect	Key supporting factors
Pakistan	Positive (0.353)	$p = 0.0045$	Positive (0.42)	FDI inflow, trade
Bangladesh	Positive (0.422)	$p = 0.042$	Positive (2.13)	Export-led manufacturing, FDI
India	Positive (0.749)	$p = 0.001$	Positive (0.45)	Market size, exchange rate

Pakistan. The positive long-run effect of FDI is consistent with endogenous growth theory, which stresses capital inflows, technology transfer, and productivity spillovers as drivers of industrial growth. The negative domestic investment coefficient, however, indicates inefficiency in capital allocation, which may stem from governance weaknesses and energy deficiency. This is consistent with studies such as Singh et al. (2023) and Waqar et al. (2023), which suggest that Pakistan's FDI raises industrial output but that weak institutions limit its potential. The positive short-run effect of FDI alongside the negative short-run effect of human capital suggests that foreign capital works quickly while skill upgrading pays off slowly. The result also helps explain why CPEC-related inflows have not translated into broad industrial deepening: energy shortages and low investor confidence (UNCTAD, 2024) reduce the productivity of the capital that does arrive.

Bangladesh. FDI is positive and significant in both the long and short run, which supports the export-led industrialization hypothesis, especially for labour-intensive manufacturing. The much larger FDI

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coefficient for Bangladesh (0.422) than for Pakistan (0.353) or India (0.749) is consistent with the observation that Bangladesh has achieved strong industrial growth than Pakistan and Indian economy has achieved more industrial growth than Pakistan and Bangladesh with comparatively modest but export-oriented inflows. The negative trade coefficient may reflect heavy reliance on imported intermediate goods, while the positive and significant exchange rate effect points to the value of a stable and predictable exchange rate for export industries. The long-run importance of FDI shows that Bangladesh has been able to absorb foreign capital effectively, in line with Mehta et al. (2023) on the role of human capital and technological absorption in spillovers.

India. FDI has a positive and significant effect on industrial production, which is consistent with market-size explanations and with theories of vertical and horizontal FDI. The positive signs on trade openness and the exchange rate suggest that India's diversified industrial base and improved business environment support the productive use of foreign capital. The negative human capital coefficient may indicate skill mismatches, which is reflected in the literature that points to structural inefficiencies in workforce training despite wide access to education (Kumar & Agarwal, 2024; Mehta et al., 2023). The strongly negative short-run effect of exchange rate changes shows the exposure of Indian industry to currency instability.

3.5 Comparative Analysis

Taken together, the results support the theoretical expectation that FDI raises industrial production when macroeconomic conditions, institutional quality, and absorptive capacity are favourable. The divergence noted in the Introduction therefore appears to reflect not the volume of FDI alone but the conditions that surround it: energy supply and capital allocation in Pakistan, export orientation in Bangladesh, and skills and exchange rate stability in India. This aligns with panel evidence that education, trade openness, and institutional quality moderate the effect of FDI (Haini & Tan, 2022; Ullah et al., 2022).

3.6 Limitations

The study uses one dependent variable and a limited set of controls. Because Bangladesh and India use the exchange rate instead of domestic investment, the three models are not strictly identical, so cross-country comparisons of coefficients should be treated as indicative. FDI is not disaggregated by sector or source country, which the literature suggests can matter for growth effects (Ullah et al., 2022; Bergougui & Murshed, 2023). Future work could use sectoral FDI data, institutional quality indicators, and estimators that allow for structural breaks.

4. Conclusion and Policy Suggestions

This study examined the effect of FDI inflows on industrial production in Pakistan, Bangladesh, and India over 1980–2024 using the ARDL bounds testing approach. ADF tests showed mixed orders of integration in all three countries, which justified the ARDL framework, and bounds tests confirmed a long-run cointegrating relationship in each case. FDI has a positive and statistically significant long-run effect on industrial production in all three countries, and a positive and significant short-run effect as well. The null hypothesis that FDI does not affect industrial production is therefore rejected for each country. Other determinants differ: domestic investment is negative and significant in Pakistan, trade is negative and significant in Bangladesh, the exchange rate is positive and significant in Bangladesh, and human capital is negatively signed in India. Stability tests indicate that the estimated relationships are stable over the sample.

These results lead to country-specific recommendations.

4.1 Pakistan

Policymakers should ensure political and macroeconomic stability through policy continuity and transparent regulation to regain investor confidence. Special Economic Zones should be strengthened with reliable energy, effective logistics, and digitalization, and extended beyond CPEC routes to diversify the industrial base. Because domestic investment has a negative effect, the priority is to raise capital productivity, reduce non-productive spending, and ensure that domestic investment complements rather than substitutes for foreign capital. Technical education, industrial training, and university–industry cooperation should be expanded to improve absorption of FDI, and joint ventures, innovation centers, and FDI-linked research and

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development should support technology transfer. A simpler, investment-friendly tax regime with incentives directed to export and high-technology sectors, together with investment in transport, energy, and communication infrastructure, would add to industrial competitiveness.

4.2 Bangladesh

Because industrial diversification is limited by overreliance on garments, FDI should be encouraged in pharmaceuticals, information and communication technology, electronics, renewable energy, and Agro processing. The negative trade effect points to inefficiencies in trade management, so port facilities, customs procedures, and transport logistics should be improved. A stable and competitive exchange rate should be maintained to support export-oriented industries. Technical, vocational, and skill development programs should be expanded to raise absorptive capacity, investment approval procedures simplified, and institutions strengthened. Export Processing Zones should be modernized with reliable energy and digital infrastructure, and joint ventures between foreign and domestic firms encouraged to widen technology spillovers.

4.3 India

India should continue to attract high-technology and green FDI in advanced manufacturing, clean energy, and digital industries, in line with the Make in India and Atmanirbhar Bharat initiatives. The negative human capital coefficient suggests a mismatch between education and industrial needs, so industry-linked curricula, vocational training, and digital literacy should be emphasized. Participation in global value chains can be deepened through better export logistics, trade facilitation, and support for small and medium enterprises. Exchange rate stability and monetary discipline should be maintained, industrial corridors such as Delhi–Mumbai and Chennai–Bengaluru expanded, regulations on land acquisition, labour, and taxation simplified, and FDI-linked research centres and industry–academia collaboration encouraged.

4.4 Regional Perspective

Across the three countries, FDI consistently has a positive long-run effect on industrial production, but its effectiveness depends on human capital quality, trade efficiency, and macroeconomic stability. Regional cooperation in FDI promotion, trade facilitation, and technological collaboration can accelerate industrialization across South Asia and support inclusive economic development.

Ethics Statement

This study adhered to all ethical standards of research during the conducting of this study. We collected data from secondary sources, and no human participants were involved in the collection of data. Therefore, there is no conflict of interest of any human participant to this study.

Author's Contributions

All author/s participated in ideation, development, and writing the manuscript. All authors read and approved the final manuscript.

Conflict of Interest Statement

The author/s declare that there is no conflict of interest regarding the publication of this article.

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Data Availability

The datasets generated and analysed during the current study are available from the corresponding author upon reasonable request. The authors are committed to transparency and will provide detailed methodological information and analysis protocols upon request.

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